



US005335944A

United States Patent [19]

Mitsui et al.

[11] Patent Number: 5,335,944

[45] Date of Patent: Aug. 9, 1994

[54] HOSE COUPLING STRUCTURE

[75] Inventors: Kenichi Mitsui; Isao Fukuzono, both of Inazawa, Japan

[73] Assignee: Toyota Gosei Co., Ltd., Nishikasugai, Japan

[21] Appl. No.: 856,768

[22] Filed: Mar. 24, 1992

[30] Foreign Application Priority Data

| | | |
|--------------------|-------|----------|
| Mar. 25, 1991 [JP] | Japan | 3-059233 |
| Oct. 14, 1991 [JP] | Japan | 3-265064 |

[51] Int. Cl.⁵ F16L 41/00

[52] U.S. Cl. 285/156; 285/239; 285/292; 285/371; 285/423

[58] Field of Search 285/256, 423, 8, 234, 285/21, 371, 292, 114, 149

[56] References Cited

U.S. PATENT DOCUMENTS

| | | | |
|-----------|---------|----------------|-----------|
| 2,314,315 | 3/1943 | Scheele | |
| 3,291,507 | 12/1966 | Clay | 285/114 |
| 4,258,935 | 3/1981 | Rodrigo et al. | 285/423 X |
| 4,558,889 | 12/1985 | Gant | 285/423 X |
| 4,718,700 | 1/1988 | Horch et al. | 285/423 X |
| 4,790,573 | 12/1988 | Cardozo | 285/423 X |
| 4,848,801 | 7/1989 | Grabowski | 285/21 |
| 4,842,914 | 8/1989 | Lyall | 285/21 |

| | | | |
|-----------|---------|-------|-----------|
| 4,955,970 | 9/1990 | Kivi | 285/149 |
| 5,033,775 | 7/1991 | Matte | 285/156 X |
| 5,060,983 | 10/1991 | Lee | 285/423 X |

FOREIGN PATENT DOCUMENTS

| | | |
|---------|---------|--------------------|
| 0286973 | 10/1988 | European Pat. Off. |
| 1523331 | 3/1967 | France |

Primary Examiner—Dave W. Arola
 Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57] ABSTRACT

In order to easily automate the coupling work of a pipe and a hose without damaging the mechanical strength of the structure, a hose with a coupling portion includes a nipple, a hose inserted into the end portion of the nipple, and a resin covering portion integrally covering the coupled portion of the hose and the pipe, the hose being previously configured to include a general part having an inner diameter equal to that of the nipple, a first enlarged part having a diameter enlarged at the fore end of the general part, the inner diameter of the enlarged part being smaller than the outer diameter of the nipple, and a second enlarged part having an inner diameter which gradually increases starting from the fore end of the first enlarged part and becoming larger than the outer diameter of the nipple, the first and second enlarged parts being applied to the nipple.

8 Claims, 4 Drawing Sheets

